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A digital signal processor based dc SQUID controller and its application MARK WEILERT, INSEOB HAHN, Jet Propulsion Laboratory/Caltech, 4800 Oak Grove Dr. Pasadena, CA 91109, USA[1] — We describe the design and performance evaluation of a convenient digital signal processor (DSP) based controller for a dc superconducting quantum interference device (SQUID). Program algorithms for the DSP conveniently replace major functions of an analog flux-locked-loop in a typical analog dc SQUID controller: current bias, modulation signal, demodulation, filtering, integration, feedback, and reset. The entire system was built using commercially available electronics (a DSP based A/D and D/A board, and SQUID sensor) with additions of a simple operational amplifier circuit for required gain. The noise level of the non-optimized dc SQUID controller system at 1Hz was $\sim 50\ \mu\Phi_0/\sqrt{Hz}$. Application of the system was demonstrated as a readout system for a low temperature magnetic susceptibility thermometer that requires flux counting. We have also successfully combined a simple software PI temperature controller together with the DSP SQUID controller.

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